ABSTRACT

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Title of diploma thesis: Drug-resistance in parasitic helminths

The development of drug resistance in parasitic helminths poses a large threat to productivity in livestock and the control of human helminths in future. Currently there are three broad spectrum classes of anthelmintics: the benzimidazoles, the imidazothiazoles (levamisole) and the tetrahydropyrimidines (pyrantel, morantel), the macrocyclic lactones (avermectins and milbemycins). Benzimidazoles act by specific binding to parasites β-tubulin, resistance in this class of anthelmintics appears to be associated with mutations in β-tubulin genes. Resistance to levamisol or pyrantel, drugs which act as an agonist at nicotinic acetylcholine receptors, is probably caused by amount reduction or by loss of affinity in these receptors. Macrocyclic lactones mode of action is not fully understood, but there appears to be relation with modulating glutamate-gated chloride channels present on muscle membranes of the parasites. Recent studies revelead that P-glycoprotein and others ATP transporters are involved in anthelmintic resistance. Modes of action and factors influencing the development of resistance to anthelmintics need more research, up to now we have the most findings about benzmidazole resistance in veterinary nematodes. Antiparasitic programmes and alternative strategies offer feasible solutions to suppress anthelmintic resistance. A variety of *in vivo* and *in vitro* tests have been developed for the detection, but each suffers, to some degree, from lack of reliability to be used in the field. Spread of anthelmintic resistance is a major worldwide problem, especially in tropical and subtropical regions. Resistance to commonly used anthelmintics was also identified in the Czech Republic.

Keywords: anthelmintic resistance, benzimidazoles, levamisole, pyrantel, macrocyclic lactones, detection methods, helminthoses, trematoda, cestoda, nematoda